

## CLAIMS

1. A system for generating a simulated radar return signal comprising:  
first means for receiving target and waveform parameters and in accordance therewith generating a composite digital signal and  
second means for converting said digital signal to an analog signal.
2. The invention of Claim 1 wherein said system further includes third means for upconverting said analog signal to a radio frequency signal.
3. The invention of Claim 1 wherein said second means includes a digital to analog converter.
4. The invention of Claim 3 wherein said first means is adapted to calculate time-domain digital data samples representing a composite radar return waveform based on said target and waveform parameters.
5. The invention of Claim 4 wherein said composite waveform includes returns from targets embedded in clutter.
6. The invention of Claim 4 wherein said first means is adapted to generate said digital data samples at each time interval that said digital to analog converter samples data.
7. The invention of Claim 4 wherein said system further includes fourth means for storing said digital data samples.
8. The invention of Claim 7 wherein fourth means is adapted to output said digital data samples at each time interval that said digital to analog converter samples data.

9. The invention of Claim 8 wherein said fourth means includes a memory.

10. The invention of Claim 1 wherein said first means includes a processor.

11. The invention of Claim 3 wherein said system further includes a high speed bus adapted to transmit said digital signal to said digital to analog converter.

12. The invention of Claim 2 wherein said third means includes an upconverter.

13. The invention of Claim 12 wherein said system is adapted to test a radar system.

14. The invention of Claim 13 wherein said upconverter is adapted to receive a coherent reference signal from said radar and to mix said reference signal with said analog signal to generate said radio frequency signal.

15. The invention of Claim 3 wherein said digital to analog converter is adapted to receive a reference signal from said radar and in accordance therewith generate a digital to analog converter clock.

16. The invention of Claim 10 wherein said processor is adapted to receive a synchronization signal from said radar and in accordance therewith begin outputting said digital signal.

17. The invention of Claim 9 wherein said memory is adapted to receive a synchronization signal from said radar and in accordance therewith begin outputting said digital signal.

18. The invention of Claim 9 wherein said memory is adapted to receive and store digitally recorded data and output said data to said digital to analog converter.

19. The invention of Claim 1 wherein said system further includes fifth means for receiving input data regarding a target scenario and in accordance therewith calculating said target parameters.

20. The invention of Claim 19 wherein said target scenario includes a plurality of targets.

21. The invention of Claim 19 wherein said target parameters include Doppler frequency, delay, and amplitude for each target.

22. A radar target simulator comprising:

a processor adapted to receive target and waveform parameters and in accordance therewith calculate time-domain digital data samples representing a composite radar return waveform;

5 a digital to analog converter adapted to convert said digital samples to an analog signal; and

an upconverter adapted to convert said analog signal to a radio frequency signal.

23. The invention of Claim 22 wherein said system further includes an interface computer adapted to receive input data regarding a target scenario and in accordance therewith calculate said target parameters.

24. The invention of Claim 22 wherein said composite waveform includes returns from targets embedded in clutter.

25. The invention of Claim 22 wherein said system further includes a memory for storing said digital samples prior to being input to said digital to analog converter.

26. The invention of Claim 25 wherein said memory is adapted to receive and store digitally recorded data and output said data to said digital to analog converter.

27. A target simulator for testing a radar system having  $n$  antenna ports comprising:

an interface computer adapted to receive input data regarding a target scenario and in accordance therewith calculate target and waveform parameters for each

5 antenna port, and

$n$  synthesis modules, each module including:

a processor adapted to receive said target and waveform parameters for one of said antenna ports and in accordance therewith calculate time-domain digital data samples representing a composite radar return waveform for said port;

10 a digital to analog converter adapted to convert said digital samples to an analog signal; and

an upconverter adapted to convert said analog signal to a radio frequency signal.

28. A target simulator for testing a radar system having  $n$  antenna ports comprising:

a processor adapted to receive target and waveform parameters and in accordance therewith calculate time-domain digital data samples representing a

5 composite radar return waveform;

a digital to analog converter adapted to convert said digital samples to an analog signal;

an upconverter adapted to convert said analog signal to a radio frequency signal; and

10           a radio frequency splitter adapted to split said radio frequency signal into  $n$  output signals.

29. The invention of Claim 28 wherein said target simulator further includes first means for applying a delay to each of said  $n$  output signals.

30. The invention of Claim 29 wherein said first means includes  $n$  radio frequency time delays, each delay adapted to delay one of said  $n$  output signals.

31. The invention of Claim 28 wherein said target simulator further includes second means for applying a Doppler frequency to each of said  $n$  output signals.

32. The invention of Claim 31 wherein said second means includes  $n$  frequency generators, each frequency generator adapted to apply a Doppler frequency to one of said  $n$  output signals.

33. A system for testing a radar comprising:

a digital target simulator including:

a processor adapted to receive target and waveform parameters and in accordance therewith calculate time-domain digital data samples representing a

5 composite radar return waveform;

a digital to analog converter adapted to convert said digital samples to an analog signal; and

an upconverter adapted to convert said analog signal to a radio frequency signal; and

10 a mechanism for testing the transmit signal from said radar.

34. The invention of Claim 33 wherein said mechanism is adapted to receive a transmit signal from said radar, delay said transmit signal, and transmit the delayed signal back to said radar.

35. The invention of Claim 33 wherein said mechanism includes a fiber optic delay line.

36. A method for simulating a radar return signal including the steps of:  
receiving target and waveform parameters and in accordance therewith  
calculating time-domain digital data samples representing a composite radar return  
waveform;

5        converting said digital samples to an analog signal; and  
      converting said analog signal to a radio frequency signal.